We Claim:

1. A method for the characterization of a particle comprising the steps of:

observing a first physical position of a particle,

optically illuminating the particle to subject it to an optical force,

observing the second physical position of the particle, and

characterizing the particle based at least in part upon reaction of the particle to the optical force.

2. The method of claim 1 wherein the optical illumination includes an optical gradient field.

3. The method of claim 2 wherein the optical gradient field is a moving optical gradient field.

4. The method of claim 1 wherein the optical illumination includes an optical scattering force field.

5. The method of claim 1 wherein the optical illumination includes a moving optical gradient force field and another force.

6. The method of claim 1 wherein the first position and second position are different.

7. The method of claim 1 wherein the positions are the same.

8. The method of claim 7 wherein the characterization includes non-movement as indicative of the state.

9. The method of claim 7 wherein the characterization includes a non-positional parameter.

10. The method of claim 9 wherein the non-positional parameter is rotation of the particle.

11. The method of claim 1 wherein the characterization involves a comparison of the first position and the second position.

12. The method of claim 6 wherein the amount of difference of movement indicates a characterization state.

13. The method of claim 6 wherein the direction of movement is indicative of a characterization state.

14. The method of claim 1 wherein the characterization utilizes the optophoretic constant of the particle.

15. The method of claim 1 wherein the characterization utilizes the optophoretic signature of the particle.

16. A method for analyzing particles comprising the steps of:

electrokinetically moving the particles, and

subjecting the particles to optical forces for sorting.

17. The method of claim 6 wherein the optical force is an optical gradient force.

18. The method of claim 6 wherein the optical force is a moving optical gradient field.

19. The method of claim 6 wherein the optical force is an optical scattering force.

20. The method of claim 6 wherein the electrokinetic force is an electrophoretic force.

21. The method of claim 6 wherein the electrokinetic force is a dielectrophoretic force.

22. The method of claim 6 wherein the electrokinetic force is an electroosmotic force.

23. A method for separating particles comprising the steps of:

subjecting particles to optical gradient force,

analyzing where information comes merely from the fact that particle moved, or moved in a particular way, and

separating desired particle from other particles.

24. The method of claim 14 wherein the separation is fluidic.

25. The method of claim 14 wherein the separation is mechanical.

26. The method of claim 16 wherein the mechanical separation utilizes a capture structure.

27. The method of claim 14 wherein the separation is optical.

28. The method of claim 18 wherein the optical separation uses an optical tweezer.

29. The method of claim 18 wherein the optical separation uses an optical gradient force.

30. The method of claim 18 wherein the optical separation uses an optical scattering force.

31. A method for determining the dielectric constant of a particle comprising the steps of:

subjecting the particle to an optical gradient force in a plurality of media having different dielectric constants,

monitoring the motion of the particle when subject to the optical gradient force in the various media, and

determining the dielectric constant of the particle based upon the relative motion in the various media.

32. The method of claim 22 wherein the media are in different vessels.

33. The method of claim 22 wherein the media gradient is in one vessel.

34. The method of claim 24 wherein the vessel is a tube.

35. The method of claim 25 wherein the tube has a gradient of dielectric constant along its length.

36. A method for separating particles according to size comprising the steps of:

subjecting the particles to a optical fringe pattern,

moving the fringes relative to the particles,

wherein the improvement comprises selecting the period of the fringes to have a differential effect on differently sized particles.

37. The method of claim 27 wherein certain of the particles are smaller than the period and certain of the particles are larger than the period.

38. The method of claim 28 wherein the larger particles are larger than the fringe period.

39. A method for separating particles based upon flexibility, comprising the steps of:

subjecting the particles to an optical pattern having fringes, the fringe spacing being less than the size of the particle in an uncompressed state,

moving the fringes relative to the medium containing the particles, and

whereby particles having relatively higher flexibility are separated from those with relatively lower flexibility.

40. A method for separating particles comprising the steps of:

providing one or more particles,

subjecting particles to light so as to cause a scattering force on the particles, and

separating the particles based upon the reaction to at least the scattering force.

41. A method for separating particles comprising the steps of:

determining first positions of two or more particles,

subjecting the particles to an optical gradient force to effect relative motion of the particles,

determining second positions of the particles, and

selectively removing a subset of the particles based upon a force other than the gradient force.

42. A method for separating particles having different dielectric constants comprising the steps of:

separating the particles in a medium having a dielectric constant chosen to enhance the sensitivity of the discrimination between the particles, and

changing the medium to one having a dielectric constant which causes faster separation between the particles.

43. The method for separating particles of claim 42 wherein the sensitivity is enhanced by utilizing a medium having a dielectric constant which is closer to one species of particle than the other.